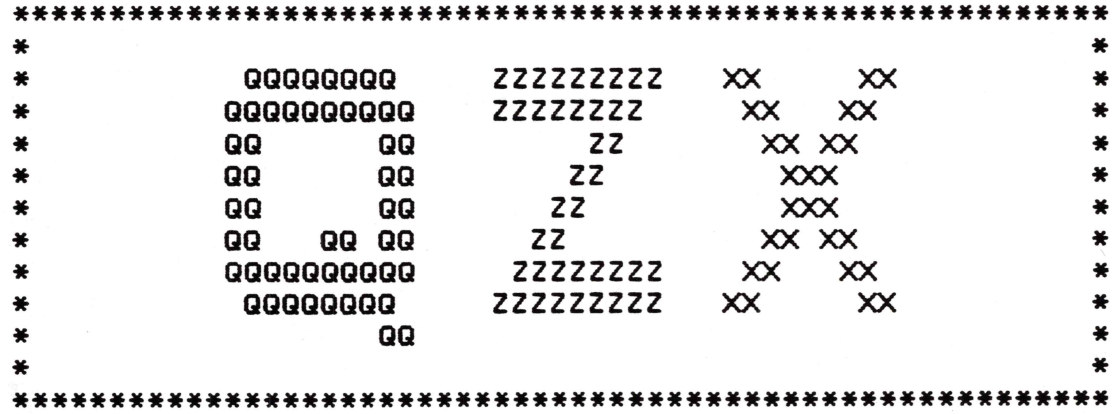
QQQQQQQ ZZZZZZZZZ XX XX
QQQQQQQQQQ ZZZZZZZZ XX XX
QQ QQ ZZ XX XX
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QQ QQ ZZ XXX
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The Journal Covering Amateur Radio & Sinclair Computers
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* EDITOR'S NOTES K5XY
* QL DATA INTERFACE 1 K5XY
* EPROM PROGRAMMER, EP1000 LU8MAD
* UNCLASSIFIED ADS

EDITOR'S NOTES
K5XY

I received a nice letter from WA6DLI. He has some very stylish cream colored microperf continuous form computer writing paper. He also got a real bargain on a printer and has it working very nicely on his QL. He mentioned that Computer Shopper, one of the few general purpose computer magazines to still run a Sinclair column, has just been purchased by Ziff-Davis, which does not have a very good track record for running computer magazines.

He also implied that I had a garage full of Easy Up Antenna... books because I have been advertising them despite the fact that he had bought one for a friend and former subscriber in Sweden. The fact is that I had two and nobody else has wanted the other one yet.

Bob also wrote that the librarian of QUANTA (the QL Users and Tinkerers Association) has changed since he mentioned it in his satellite article. The new librarian is Rick Bazan, 28 Windsor Place, Nutley, NJ 07110.

There is a T/S Fest in Maryland on May 6 and 7. There has been more publicity about this one than most of the others that I have heard about. It is still a little far away for me to attend, but I know that some of our subscribers will be there and write something about it. For more details see the unclassifieds in this issue.

I received a long letter from Mc Brine Computer Products, a creator of T/S software. He is switching over to the shareware concept and wants everybody to know that all are free to copy any tape they have obtained from him and to give the copy to anybody with the proviso that the recipient send him whatever sum they feel the tape is worth.

I have heard that after March 30 the VISTA public domain TS1000 library will be merged with the SNUG library. The VISTA library consists of five C-60 tapes.

The back page has been redesigned slightly to correct a hyphenation error, add a missing closing paren, and to improve the readablity of the subscription form.

This issue also marks the beginning of a series of articles on a particular data acqusition interface in which I will offer an explanation of these very useful computer additions.

QL DATA INTERFACE
K5XY

Computers can do much more than store and manipulate data and programs. They can control other equipment, such as a TNC, or collect the data itself. It is easy to make a computer act like a digital voltmeter; and, with a little more programing, it can serve as something as complicated as a digital oscilloscope. To collect data you need a data acquisition interface.

Just such an item has been advertised in QZX for the last couple of months by Prairie Digital. Their QL Data Acquisition System is flexible, simple, easy to use, and inexpensive. It is also well designed for its purpose and certainly versatile enough for any ham shack.

QZX has been fortunate enough to get one to test. Such an interface represents an accessory which greatly increases the utility of a computer, especially in a technical environment such as the typical ham shack. Since many of our readers are unfamiliar with an interface of this type, I shall write a series of articles describing it in some

detail. This and following articles will describe the operation of the board, the board itself, the results of tests, and give some indication of the software necessary to operate the board.

The board is a small fiberglass printed circuit board which plugs into the expansion port on the left end of the QL. This board contains 24 lines of programable I/O, an 8 channel 8 bit A to D converter, and a 12 bit counter, all on a board which sells for less than $90.00.

Now then what does all this mean? First I shall discuss the 24 lines of programmable I/O. That just means that there are 24 different pads on the board which can be influenced by the computer or which can influence the computer. These 24 lines are organized into three 8 bit bytes and are associated with three specific memory locations in the computer. One can either read out the contents of that memory location so that the 1's and 0's of that location appear as 5 or 0 volts on the card thus outputting information to the world; or one can write 1's and 0's to the memory location according to the presence of either 5 or 0 volts on the line thus placing information from the world into the computer.

Each of the three ports A,B, or C can be an input port or an output port depending on the instructions given to the board by the computer. Port C can even be split so that the high four bits can be programed separately from the low four bits. A good programmer can easily control each bit of the eight bit port individually so one could, for example, build a large bank consisting of 24 separate relays and independently control 24 separate lights or appliances. No ham is likely to do that. But one could easily assign one line to the push to talk circuit of a scanning 2 meter tranceiver, another to the up channel selection button, and a third to the down button.

These lines can be used for input too. One could connect the squelch circuit of a packet receiver to one line; and, with a simple timing program, determine the percent of time a packet channel was in use during the night. With 24 lines the possibilities can get quite complicated.

These I/O lines are digital. That is, they respond to the presence of absence of a signal. They are TTL compatible. That is, they respond to or provide 0 or 5 volts. Actually they regard as 0 or low any voltage less that 0.8 volts and as 1 or high any voltage above 3.5 volts.

The A to D converter is even more useful. This converter takes an analog signal in the 0 to 5 volt range and converts it into a series of eight digital pulses, hence the name of 8 bit analog to digital converter. Because the converter provided 256 different eight bit output codes, the five volt input range has a resolution of better than 20 millivolts.

The fact that this board has an eight channel A to D converter means that there is a multiplexer on the board that switches the A to D converter to one of eight different input lines depending on which one the software wants to be connected. The multiplexer could also continually scan any desired number of channels. You could, for example, continually monitor the AC line, the output of your power supply, the temperature of your final, and the signal strength of the station with which you are talking.

Well I am out of room for this month. Next month we will give more details of the circuit and some general comments on the construction.

EPROM PROGRAMMER, EP 1000

LU8MAD

THE EPROM PROGRAMMER PROGRAMS EPROM's ONE BYTE AT A TIME. REFERING TO THE SCHEMATIC, THE ADDRESS OF THE MEMORY LOCATION TO BE PROGRAMMED IS PLACED ON THE EPROM PROGRAMMER's ADDRESS BUS AND THE DATA TO BE PROGRAMMED IS PLACED ON THE DATA BUS BY THE PPI 8255AC-5.

BOTH THE ADDRESS AND DATA LINES MUST BE HELD IN THEIR VALID STATE WHILE A PROGRAM PULSE IS APPLIED TO THE PROGRAM PIN.

AFTER THE PULSE IS TERMINATED (TYPICALLY 50ms HIGH-LEVEL TTL), THE NEXT ADDRESS, ALONG WITH THE CONTENTS TO BE STORED THERE, ARE SENT TO THE EPROM AND ANOTHER PROGRAM PULSE IS ISSUED.

THE BASIC PROGRAM USES PROMPTS TO ALLOW THE USER TO SELECT THE FILE TO BE PROGRAMMED, THE ADDRESS THAT THE FILE IS LOCATED ON, AND THE NUMBER OF BYTES TO BE PROGRAMMED.

AFTER ALL LOCATIONS ARE PROGRAMMED, THE EPROMs CAN ALSO BE VERIFIED USING "WRITTEN VERIFICATION" OPTION OF MENU.

IN ADDITION TO BURNING EPROMs, THE EP-1000 DEVICE CAN BE USED TO CHECK AN EPROM FOR COMPLETE ERASURE (i.e. TO MAKE ABSOLUTELY SURE THAT A EPROM IS BLANK BEFORE PROGRAMMING).
AS SHOWN IN SCHEMATIC, THE SIGNALS AND VOLTAGES DEVELOPED ARE SENT TO THE EPROM ZIF(ZERO INSERTION FORCE) SOCKET, SOME DIRECTLY, ANOTHER THROUGH THE PERSONALITY MODULE SOCKET.

THIS SOCKET, ACCEPTS A PERSONALITY MODULE THAT IS MADE FOR EACH STYLE OF EPROM. THE MODULE CAN BE MADE ON A DIP HEADER WITH APPROPRIATE JUMPERS. IN UPPER RIGHT OF SCHEMATIC, ARE DEFINED SOME MODULES.

CAUTION:

BEFORE YOU TRY TO PROGRAM ANY EPROM, MAKE SURE YOU HAVE THE MANUFACTURER'S DATA SHEETS. PINOUTS, VOLTAGE REQUIREMENTS, PGM PULSE AND PROGRAMMING SEQUENCES CAN VARY FROM ONE MANUFACTURER TO ANOTHER AND FROM OLDER DEVICES TO NEWER ONES.
DOUBLE CHECKING IS THE SAFESTAND SUREST WAY TO AVOID PROBLEMS.

CONSTRUCTION:

IT IS RECOMMENDED-BUT NOT ESSENTIAL-THAT THE EP1000 PROGRAMMER BE BUILT ON PC BOARD (PROTOTYPE PCB PATTERN IS SHOWED IN FIG.2)
COMPONENT PLACEMENT, GENERAL SIGNAL ROUTING, AND CONSTRUCTION METHOD ARE NOT CRITICAL AND ARE THEREFORE LEFT TO YOUR DISCRETION. DON'T FORGET THAT THE EP1000 PROGRAMMER NEEDS AN EXTERNAL SOURCE OF PROGRAMMING VOLTAGE (AS +28V, +25V, +21V, +12.5V, Etc. ACCORDING TO EPROM THAT YOU WISH TO PROGRAM. A VARIABLE POWER SUPPLY (100mA) IS PREFERRED).

THE PERSONALITY-MODULE SOCKET WILL ACCEPT A 16-PIN HEADER PLUG, WHICH MUST BE PRE-WIRED FOR A PARTICULAR TYPE OF EPROM. ONCE YOU INSTALL THE JUMPERS ON THE HEADER, LABEL IT "2732", "2764", AND SO.

THE PROGRAM PULSE:

THE CIRCUIT WAS DESIGNED TO ALLOWS TWO WAYS TO MAKE PGM PULSE:
a- HARDWARE. BY MEAN OF A IC TIMER. THEREFORE PRECISE PULSE WIDTHS ARE NEEDED, AND THE BEST WAY OF GENERATING THEN IT IS TO USE A 7555 IC, WHICH IS THE CMOS VESION OF THE UBIQUITOUS 555 TIMER.
IT HAS A BUILT-IN PRECISION VOLTAGE COMPARATOR THAT ACTIVATES INTERNAL FLIP-FLOPS AND PRECISELY CONTROLS THE OUTPUT PULSE WIDTH ,IRRESPECTIVE OF WIDE VARIATIONS IN SUPPLY VOLTAGE AND TEMPERATURE.

THE DURATION OF THE OUTPUT HIGH STATE IS GIVEN BY T=1.1(Ri*C1). YOU MUST USE 1% RESISTOR AND HIGH QUALITY CAPACITOR. THE INVERTER GATE 1d OF 74LS04 IC ALLOW TO CHOOSE PULSE OF HIGH OR LOW STATE.

b-SOFTWARE. BEFORE YOU CAN USE THE PROGRAMMER, YOU WILL HAVE TO WRITE SOME SOFTWARE TO CONTROL IT, OR (EASY WAY) USE MY PROGRAM LISTING.

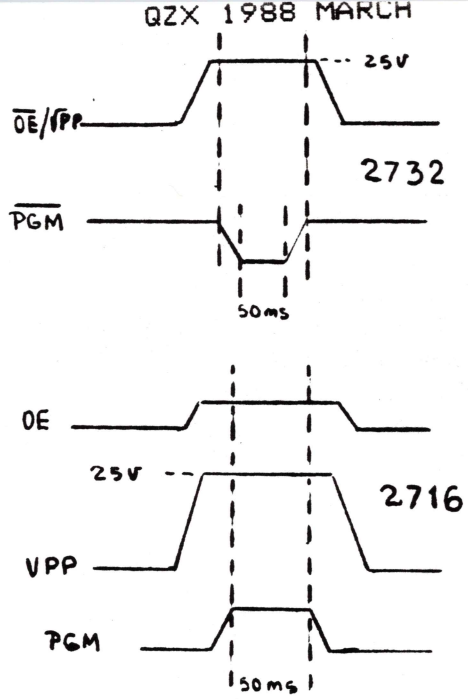
A SIMPLE METHOD IS TO STORE THE INTENDED EPROM CONTENTS IN A MAIN MEMORY AREA AND USE SOFTWARE TO TRANSFER THAT DATA TO THE PROGRAMMER. THE PROGRAM WILL HAVE TO SEND ADDRESS AND DATA BITs FROM PPI8255 TO EPROM, AND MUST CONTROL THE PROGRAM PULSE WIDTH BY MEANS OF MACHINE LANGUAGE AND APPROPRIATE DELAY.

DON'T FORGET THAT ONLY A SINGLE PULSE PER ADDRESS IS PERMITTED WITH SINGLE-SUPPLY EPROM TYPES AND THE PULSE WIDTH MUST BE 50 MILLISECONDS, +/- 10%.

ONCE THE RAW PROGRAM IS DEVELOPED TO YOUR SATISFACTION, YOU CAN WORK ON ADJUSTING THE PULSE WIDTH. YOU CAN DO THAT EASILY WITH THE AID OF AN OSCILLOSCOPE BY SIMPLY MEASURING OUTPUT AT PC6 (PIN 11 OF 8255) AND CHANGING THE SOFTWARE DELAY ACCORDINGLY.

ACCORDING TO F.L.DATS (RE 11-84).."IF YOU DON'T HAVE AN OSCILLOSCOPE, USE A CLOCK OR WATCH TO MEASURE THE TIME IT TAKES TO TRANSFER ONE O TWO KILOBYTES. RUN THE PROGRAM WITH THE EPROM SOCKET EMPTY, AND ADJUST THE SOFTWARE DELAY UNTIL THE RUN TIME IS 100 SECONDS,+/- 3 SECONDS."

I BELIEVE THAT YOU CAN ADAPT THIS METHOD AT OUR PROGRAM. IF YOU MAKE POKE 16566,201 AND RAND USR 16558 INTO A LOOP FOR-NEXT OF 1 TO 2000 (AFTER INIZIALIZATION OF 8255 BY MEANS OF POKE 16535,201 AND RAND USR 16523), THE PROPERLY RUN TIME IS ALSO OF 100 SECONDS +/- 3 SECONDS (100 SEC/2000 = 0.05 SEC = 50 MILLISECONDS).
OTHERWISE, YOU NEED SOME DELAY BETWEEN "SET BIT 6,A" AND "RESET BIT 6,A".



ENDING:

I HAVE CHOSEN A DESIGN THAT IN SOME MEANS IS "UNIVERSAL", ONE OF THE ADVANTAGES OF THIS SCHEME IS THAT YOU CAN "PROGRAMMING" OF EP1000 PROGRAMMER WITH APPROPRIATE JUMPERS ON THE HEADER AND SELECTING VPP FROM EXTERNAL POWER SUPPLY
NOTE THAT ALTHOUGH THE STANDARD IS BASED ON A 28-PIN PACKAGE,24-PIN DEVICES SUCH AS THE 2716 EPROM CAN BE USED BY PLUGGING THE DEVICE INTO THE BOTTON 24 PINS.
FINALLY, REMEMBER THAT IT EPROM PROGRAMMER PROTOTYPE IS UNTIL NOW UNDER EXPERIMENTATION, AND CAN BE NEED SOME MINOR CHANGES FOR FINEST PERFORMANCE.

— • —

BIT SIZE AND VPP SPECIFICATIONS FOR SEVERAL COMMON EPROMS

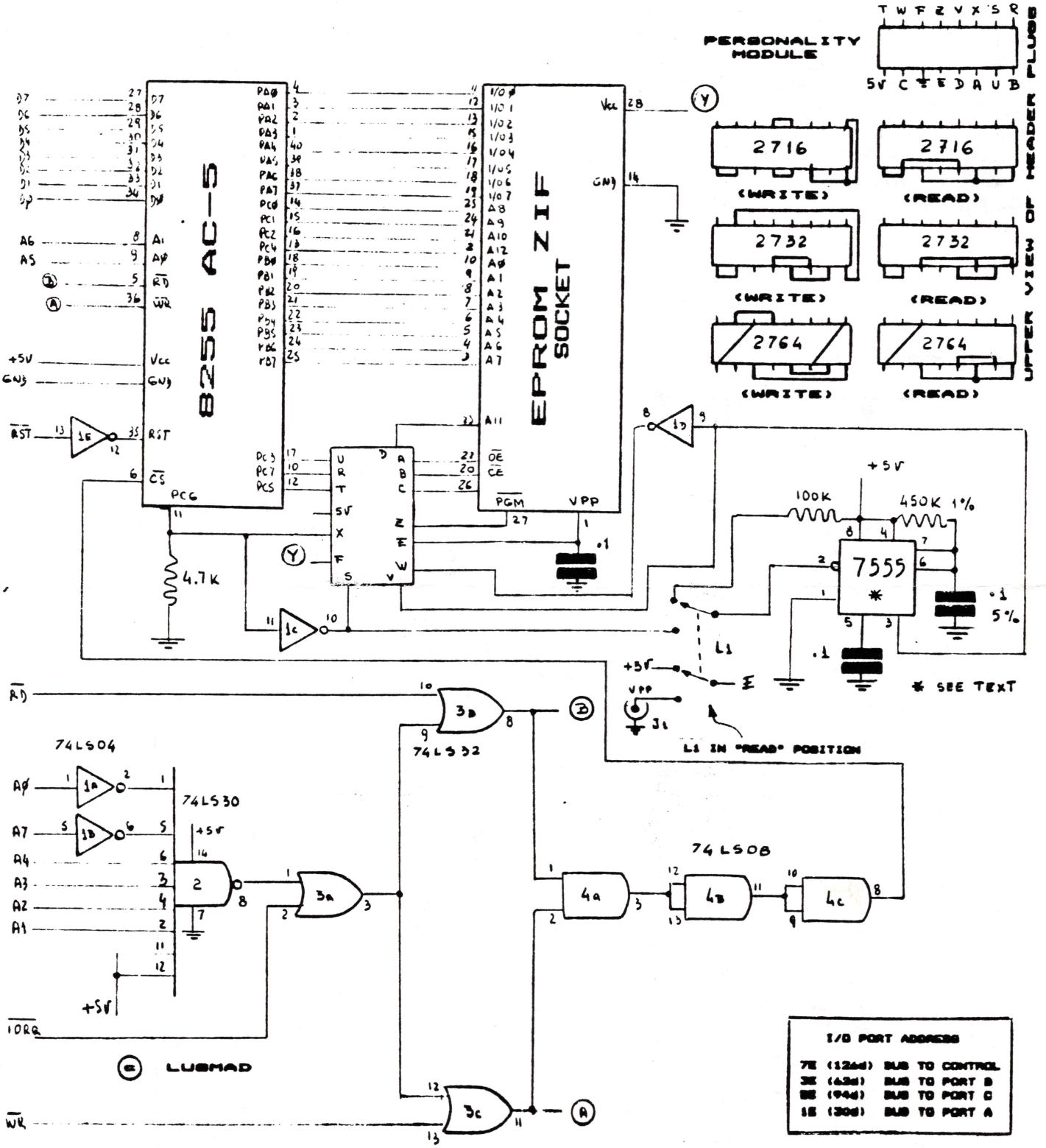
AMD	AM9716	2KX8	25V
	AM2716	2KX8	25V
	AM2732	4KX8	25V
	AM2732A	4KX8	21V
	AM2764	8KX8	21V
	AM2764A	8KX8	12.5V
	AM27128	16KX8	21V
	AM27128A	16KX8	12.5V
	AM27256	32KX8	12.5V
	AM27512	64KX8	12.5V
FUJITSU	MBM2716	2KX8	25V
	MBM8516	2KX8	25V
	MBM2732A	4KX8	21V
	MBM27C32A	4KX8	21V
	MBM2764	8KX8	21V
	MBM27C64	8KX8	21V
	MBM27128	16KX8	21V
	MBM27256	32KX8	12.5V
	MBM27C256	32KX8	12.5V
	MBM27C512	64KX8	12.5V
HITACHI	HN462716	2KX8	25V
	HN462532	4KX8	25V
	HN462732	4KX8	25V
	HN462732A	4KX8	21V
	HN482764	8KX8	21V
	HN27C64	8KX8	21V
	HN482764P	8KX8	21V
	HN4827128	16KX8	21V
	HN27128P	16KX8	21V
	HN27256	32KX8	12.5V
	HN27512	64KX8	12.5
INTEL	2716	2KX8	25V
	2732A	4KX8	21V
	P2732A	4KX8	21V
	2764	8KX8	21V
	P2764	8KX8	21V
	2764A	8KX8	12.5V
	27C64	8KX8	12.5V
	P2764A	8KX8	12.5V
	27128	16KX8	21V
	27128A	16KX8	12.5V
	P27128A	16KX8	12.5V
	27256	32KX8	12.5V
	27C256	32KX8	12.5V
	B7C256	32KX8	12.5V
	27512	64KX8	12.5V
MITSU-BISHI	M5L2716	2KX8	25V
	M5L2732	4KX8	25V
	M5L2764	8KX8	21V
	M5L27128	16KX8	21V
	M5L27256	32KX8	12.5V
MOSTEK	MK2716	2KX8	25V
MOTOROLA	MCM2716	2KX8	25V
	MCM27L16	2KX8	25V
	MCM2532	4KX8	25V
	MCM25L32	4KX8	25V
	MCM68764	8KX8	25V
	MCM68766	8KX8	25V
	MCM68769	8KX8	25V
NATIONAL	MMC2716	2KX8	25V
	MMC27C16	2KX8	25V
	MMC27C16H	2KX8	25V
	MMC27C16B	2KX8	12.5V
	MMC27C32	4KX8	25V
	MMC27C32H	4KX8	25V
	MMC27C32B	4KX8	12.5V
	MMC27C64	8KX8	12.5
	MMC27CP12816KX8		12.5
	MMC27C256	32KX8	12.5V
	MMC27C512	64KX8	12.5V
NEC	uPD2716	2KX8	25V
	uPD2732	4KX8	25V
	uPD2732C	4KX8	25V
	uPD2732A	4KX8	21V
	uPD2764	8KX8	21V
	uPD27C64	8KX8	21V
	uPD2764C	8KX8	21V
	uPD27C64C	8KX8	21V
	uPD27128	16KX8	21V
	uPD27128C	16KX8	21V
	uPD27256	32KX8	21V
	uPD27C256	32KX8	21V
ROCKWELL	R87C32	4KX8	21V
	R87C64	8KX8	21V
	R27C64P	8KX8	21V
SEEQ	2764	2KX8	21V
	5133	8KX8	21V
	27128	16KX8	21V
	5143	16KX8	21V
	27C256	32X8	12.5V
TEXAS	TMS2516	2KX8	25V
	TMS2532	4KX8	25V
	TMS25L32	4KX8	25V
	TMS2732	4KX8	25V
	TMS2732A	4KX8	21V
	TMS2564	8KX8	25V
	TMS2764	8KX8	21V
	TMS27128	16KX8	21V
TOSHIBA	TMM323	2KX8	25V
	TMM2732	4KX8	25V
	TMM2764	8KX8	21V
	TMM2764DI	8KX8	21V
	TMM27128	16KX8	21V
	TMM27256	32KX8	21V
	TC57256	32KX8	21V

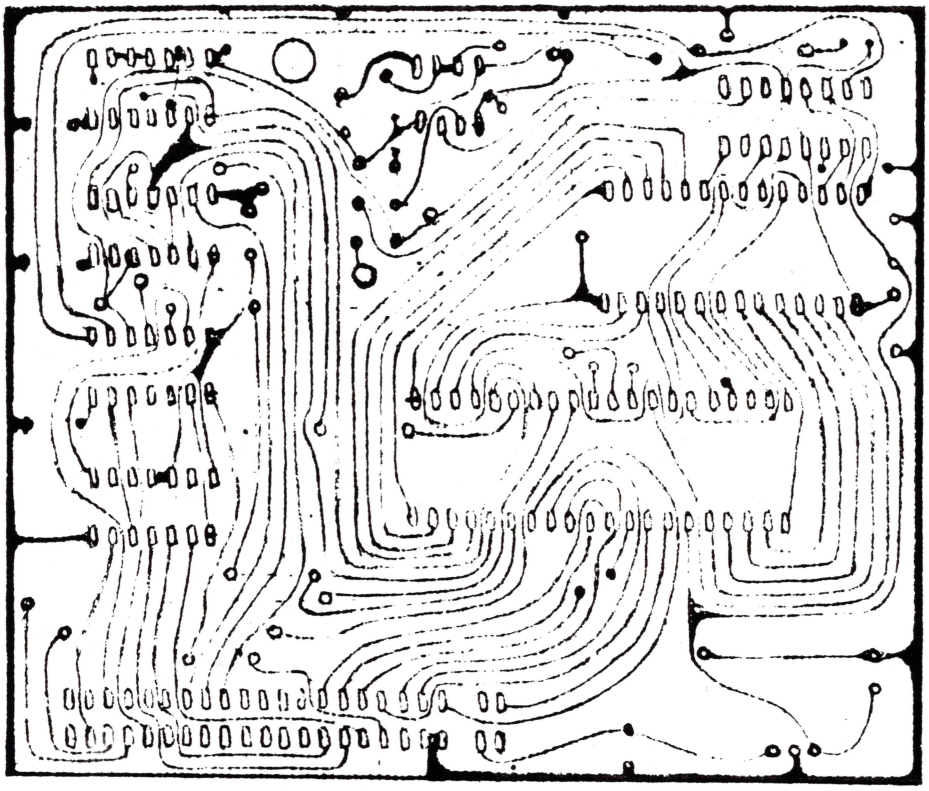
TYPE

VPP

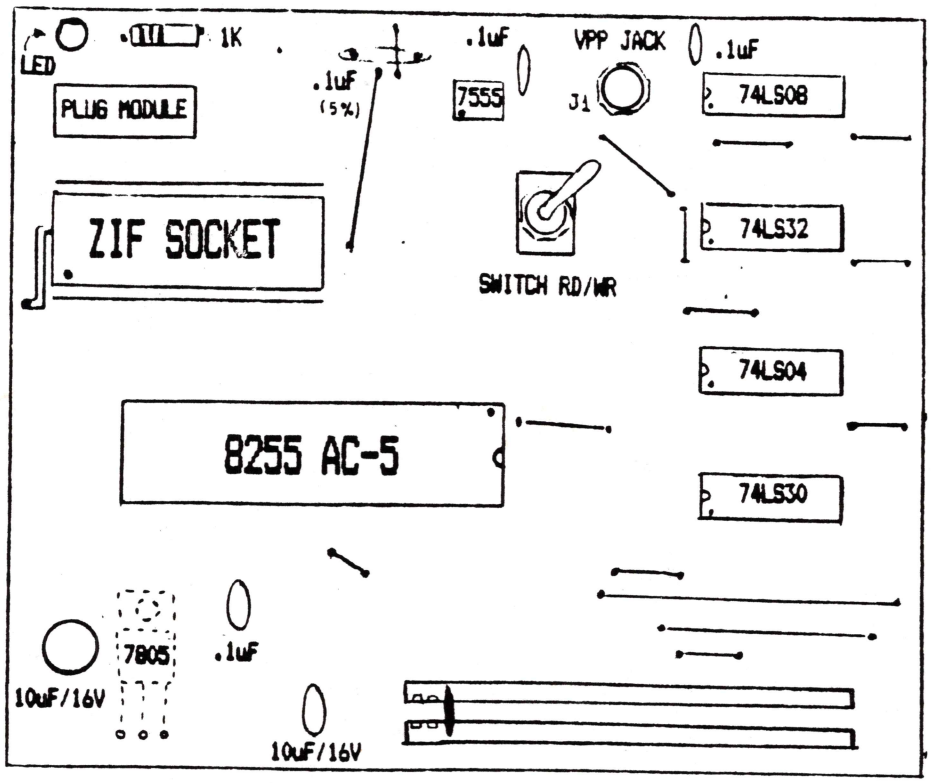
EPROM PROGRAMMER

EP1000





NOTE: SOME JUMPERS OF ISOLATED WIRE IN COPPER SIDE ARE NOT SHOWED. AS SO IC7805 AND SOME .1 CAPACITORS.



PROGRAM LIST

```
 1  REM  (CODES)

16514   195 57  117 130 0
16519   130 64  150 0   62
16524   128 211 126 62  1
16529   211 126 62  1   211
16534   126 205 126 117 237
16539   75  55  117 42  51
16544   117 237 91  53  117
16549   123 211 62  126 211
16554   30  122 203 255 203
16559   247 211  94 203 183
16564   211  94 205 111 117
16569   195 218 117 0   0
16574   0   0   0   197 245
16579   62  40  14  220 13
16584   32  253 61  32  248
16589   241 193 201 205 187
16594   2   68  77  121 254
16599   255 40  246 205 189
16604   7   126 254 55  32
16609   238 201 62  144 211
16614   126 237 75  55  117

16619   42  5?  117 237 91
16624   53  117 123 211 62
16629   122 211 94  219 30
16634   190 194 180 117 19
16639   35  11  120 177 32
16644   237 201 66  75  201
16649   62  144 211 126 237
16654   75  55  117 237 91
16659   53  117 123 211 62
16664   122 211 94  219 30
16669   254 255 194 215 117
16674   19  11  120 177 32
16679   237 201 66  75  201
16684   35  19  11  120 177
16689   194 83  117 62  0
16694   211 94  201 27  27
```

"EPROM PROGRAMMER"

by LU8MAD (c)1988

```
  1 REM  (SEE LIST)
 10 POKE 16388,204
 20 POKE 16389,116
 30 LET B=30000
 40 FOR A=16514 TO 16683
 50 POKE B,PEEK A
 60 LET B=B+1
 70 NEXT A
100 'PRINT "       EPROM PROGRAMMER"
102 PRINT AT 4,4;"P PROGRAMMED"
104 PRINT AT 8,4;"V WRITTEN VERIFICATION"
106 PRINT AT 12,4;"E ERASED VERIFICATION"
107 PRINT AT 21,6;" ENTER HIS CHOICE"
108 IF INKEY$="P" THEN GOTO 1000
110 IF INKEY$="V" THEN GOTO 1100
112 IF INKEY$="B" THEN GOTO 2000
114 IF INKEY$="" THEN GOTO 100
1000 CLS
1002 GOSUB 9000
1004 CLS
1006 PRINT ,,"APPLY VPP ,THEN PUSH ""R"" KEY"
1008 RAND USR 30000
1098 CLS
1099 GOTO 100
1100 CLS
1102 GOSUB 9000
1104 CLS
1106 LET BC=USR 30077
1108 IF BC=0 THEN PRINT "VERIFICATION ""OK"""
1110 IF BC<>0 THEN PRINT "FAILURE AT ADDRESS: ";BC
1112 INPUT Z$
1114 CLS
1116 GOTO 100
2000 CLS
2002 GOSUB 9010
2004 LET BC=USR 30135
2006 PRINT "DATA <>""FF"" IN BYTE: ";BC
2008 GOTO 1112
9000 PRINT "IMPUT FIRST ADDRESS OF RAM"
9001 INPUT A
9002 GOSUB 9100
9004 POKE 30003,L
9006 POKE 30004,H
9010 PRINT ,,"IMPUT QUANTITY OF BYTES"
9012 INPUT A
9014 GOSUB 9100
9016 POKE 30007,L
9018 POKE 30008,H
9020 PRINT "IMPUT FIRST ADDRESS OF EPROM"
9022 INPUT A
9024 GOSUB 9100
9026 POKE 30005,L
9028 POKE 30006,H
9050 RETURN
9100 LET H=INT (A/256)
9102 LET L=A-(H*256)
9104 RETURN
9998 SAVE "EPROm"
```

UNCLASSIFIED ADS

WANTED: UNCLASSIFIED ADS for publication in QZX. Cost is 1 cent for each keystroke (characters, blanks, etc.). Payment must be included with order. This is an excellent way to sell your program or unwanted equipment, ask for help, or find a specific program. Send your ad with payment to QZX, 2025 O'Donnell, Las Cruces, NM 88001.

WANTED: Appendix E,F,G of ZX99 tape contro system users manual data-cassette. Edward L. Radtke, 1602 Woodluck Ave., Louisville, KY 40205.

WANTED: Model TS2050 modem in good condx and look for other TS computer owners in the Hudson Valley Area to start a TS Comp. Club. Stu L. Ballinger (WA2BSS) 11 Lown ST, Poughkeepsie, NY 12603-3321.

SWAP: Tasman RS232 Printer Interface Spectrum software tape for a Tasman RS232 Printer Interface T/S2068 software tape and MTERM II software tape for, if someone has it, the MTERM II software cartridge. Stu L. Ballinger (WA2BSS) 11 Lown ST, Poughkeepsie, NY 12603-3321.

FEST: Cats Capital Fest to be held on May 6 and 7 at Howard Johnson's, New Carrollton, MD. Vendors, speakers and plenty of Timex/Sinclair Users. Tickets are $7.00 for 2 day admission if bought before 4/5/89. Hotel rooms, double or single are $62.00 plus 10% tax per night, plus 1 free admission to the show for the first 50 rooms rented. Friday night informal banquet is $16.50 each. Cats Capital Fest, P. O. Box 24, Garrett Park, MD. 20896 or call Audrey Curnutt, 301-439-8756.

THIS QL DATA ACQUISITION SYSTEM FEATURES:

24 LINES OF PROGRAMMABLE I/O
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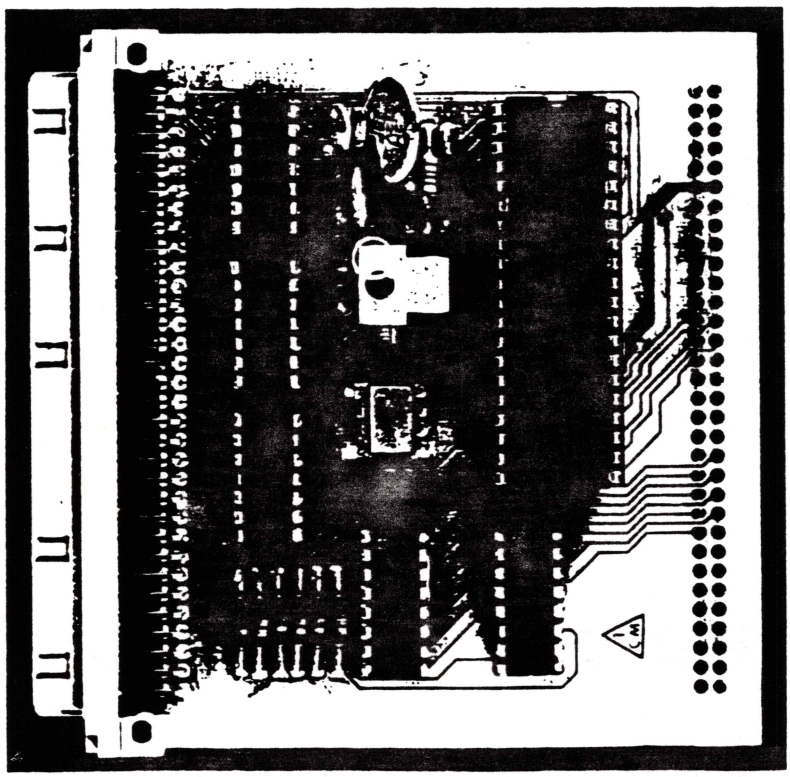

PRICING:

1 SYSTEM	$89.00	U.S. DOLLARS
2 TO 4	$79.00	"
5 OR MORE	$75.00	"

BARE CIRCUIT BOARDS $30.00

Bare board order includes complete instructions.

ADD $3.00 FOR SHIPPING AND HANDLING

SEND CHECK, MONEY ORDER, OR C.O.D.

PRAIRIE DIGITAL 4561 SANDPIPER TRAIL COTTAGE GROVE WI 53527 U.S.A.

73, K5XY

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